

## **Supporting Information:**

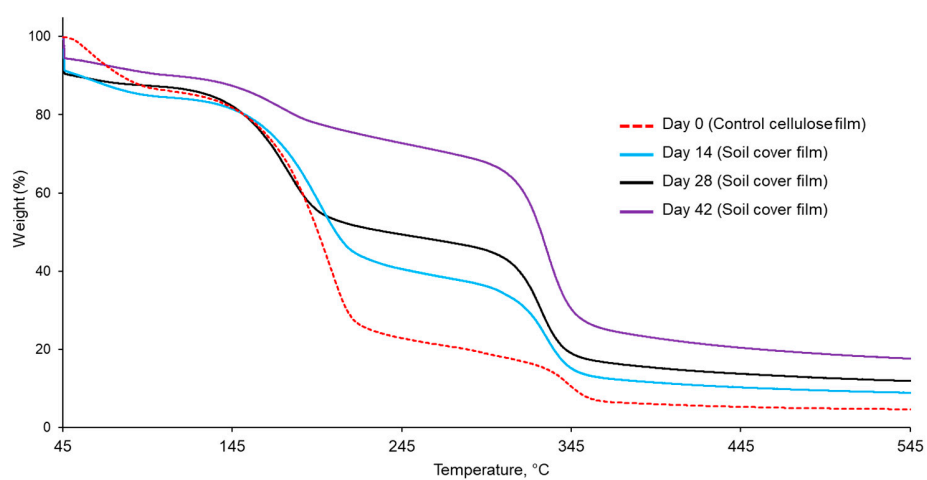
### **Upcycling Low-Quality Cotton Fibers into Mulch Materials in A Fast Closed Carbon Cycle**

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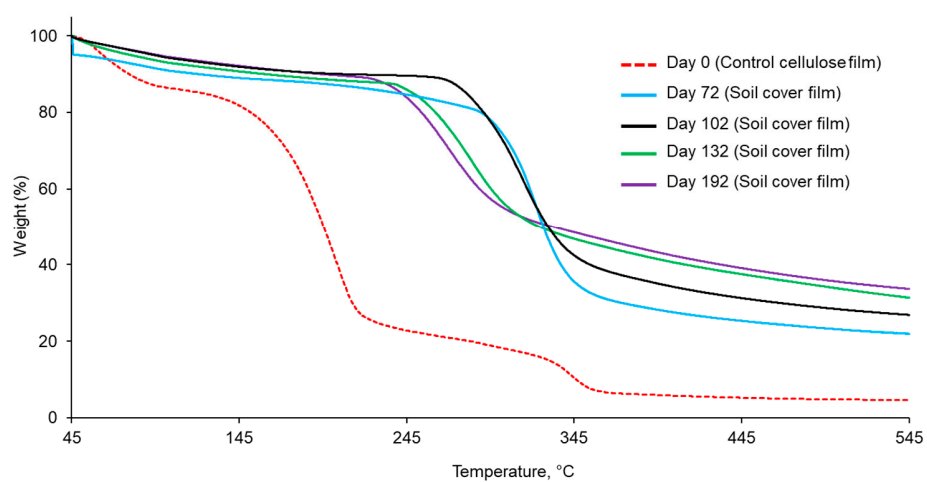
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a.

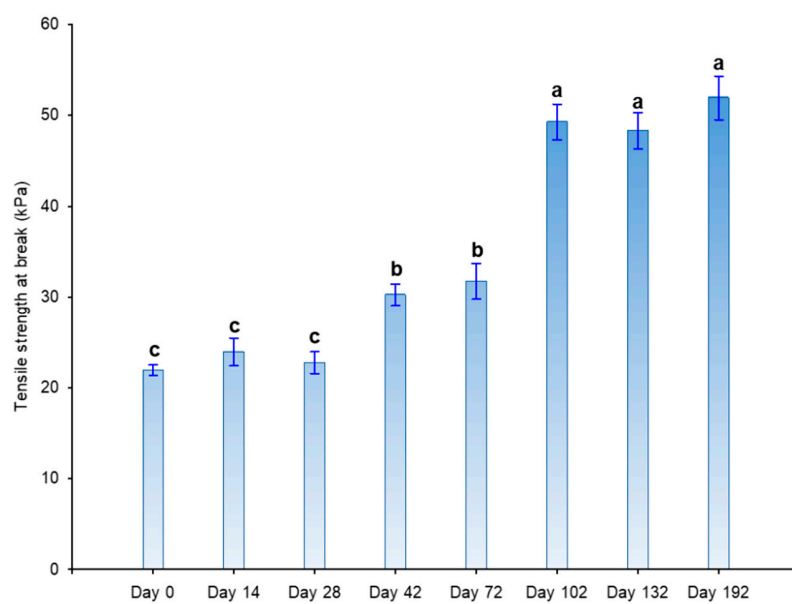


b.

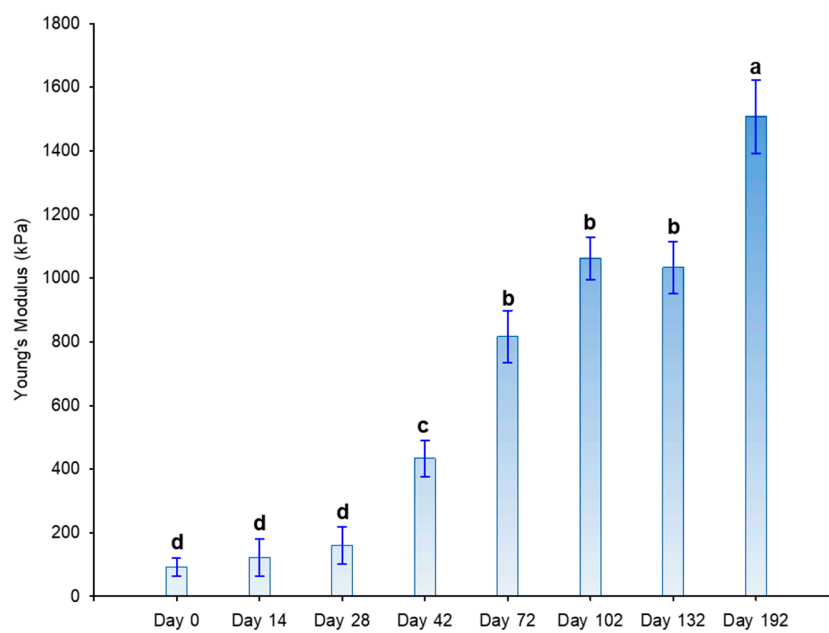


**Figure S1** TGA thermograms of the control and soil cover films from day 0-day 42 days (a) and (b) day 72- day 192.

a.



b.



**Figure S2** Tensile properties of cellulose films retrieved from soil cover experiment: (a) tensile strength; (b) Young's Modulus. Values not followed by the same letter significantly differ at  $\alpha = 0.05$ .